FINAL REPORT

"BEAVER DAMS" DEMONSTRATION PROJECT

AGREEMENT # 14-48-0001-95625

ID # 95-HR-~~19~~ 21

COMPLETED BY

GARY BLACK
SISKIYOU RESOURCE CONSERVATION DISTRICT

Siskiyou Resource Conservation District
P. O. Box 268
Etna, CA 96027

(916) 467-3975

Demonstration & Alternative Beh Obliteration Methods

Background of Scott River: The Scott River, which runs through Scott Valley, is a major tributary to the Klamath River. The Scott supports wild stocks of chinook, coho, steelhead and rainbow trout. There are many tributaries to the Scott which contain prime spawning and rearing habitats for salmon and steelhead.

The citizens of Scott Valley are proactive in their efforts to sustain anadromous populations. The Siskiyou Resource Conservation District (RCD), Scott River Watershed Coordinated Resource Management Planning (CRMP) group, and responsible agencies have developed consensus plans which site causes and solutions to declining fisheries populations in the drainage. A major goal of the Siskiyou RCD and the Scott River CRMP is to increase fall flows in the Scott River drainage.

Historically, the Scott River valley contained many sloughs and marshes where beaver lived the by the thousands. The beaver created much of the marshy areas by creating ponds with their dams. The contribution of the beaver helped provide a stable water table which allowed the riparian areas to thrive. Degradation of the pre-European habitat began in the 1830's when the Hudson Bay Trappers entered Scott Valley. One report stated that the trappers collected 1,800 beaver in one month. Further degradation of the drainage occurred when gold was found. Portions of the main stem and more then half of the tributaries were literally turned upside down in the search for gold. The last major endeavor which damaged the flow regime of the Scott River was the construction of levees and the straightening of the main stem in order to increase drainage. The Army Corps of Engineers began this project in 1938 following a flood which damaged agricultural and residential property. The Scott River was choked with sediment from over 50 years of mining. The increased sediment levels caused severe erosion in the main stem and major tributaries as the sediment transport level was unbalanced.

The straightening of the main stem of the Scott, Etna Creek, Kidder Creek, French Creek and Patterson Creek did increase drainage. Increased drainage in addition to aggradation due to poor sediment transport and other adverse affects has decreased fall surface flows in the Scott River to the point that fish passage is a major concern. Increased drainage has caused wide fluctuations in water table levels which is believed to be a limiting factor of natural riparian propagation as well as a major concern in sustaining a healthy stock of anadromous fish.

Project Need and Scope of Demonstration Project: During high flows rapid drainage is a benefit to all citizens who now live in Scott Valley. Yet, during the summer months the lack of surface water and a low water table is a benefit to no one. In order to regain a relatively stable water table there are two options: 1.)Attempt to establish the original meander pattern and introduce more beaver (attempt to reconstruct pre-European conditions) or 2.) use the current channels to store the spring flows as beaver dams did by retaining water in the aquifers.

Reconstruction of the original system is unlikely as stable stream meander curves are a coefficient of sediment transport rates, sediment size and stream gradient (flow speeds). It would be nearly impossible to restore the natural pattern of the stream until all contribution of sediment is reduced to pre-European rates. The RCD has utilized several geomorphologists in an effort to better understand the stream system and develop strategies which are cost-effective restoration programs. All have stated that a Dave Rosgen style of channel restoration will not work until sediment contribution is controlled and rates are predictable. In an area that has been heavily mined, this is very difficult if not impossible to determine.

At this point the best option seems to be to hold back spring flow and force it into the aquifers it used to occupy. Currently, the spring runoff literally races out of the valley instead of being stored in aquifers for summer months. As the runoff decreases, the water table immediately drops. Stored water could then be released to allow migrating adults to spawn further upstream where spawning and rearing habitat is better then in the lower Scott River canyon.

The purpose of the demonstration project is to determine if water can be stored in the aquifers by using sand dams to slow the flow and force water into the off channel aquifers. The stored water would then be released by increasing flow discharge out of the aquifers. The increase in flow would then allow adult chinook salmon get up stream and occupy prime spawning and rearing locations in the upper portions of Scott Valley.

Methods and Materials: The main stem of the Scott River in the center of Scott Valley was chosen as the best location. Four Dams were installed by the Siskiyou RCD between Eller Lane and Serpa Lane (approximately 6 river miles). The location was chosen for two reasons: First, there was concern that the "ponded" or slow moving water behind the dams would become warmer and increase fish mortality. The center of the valley has been considered a poor holding area for salmonids during summer months due to the lack of cover, few pools, and warm water temperatures. Therefore, no quality habitat was jeopardized by the demonstration. The second reason was because the area has an extremely low gradient (1 foot of drop per on thousand feet). Therefore more water could be stored by fewer dams.

The RCD waited to install the dams until the water temperatures in the site exceeded 72 degrees Fahrenheit for nearly a week. This was to insure as few fish were in the location as possible in case the demonstration created excessively warm water temperatures. The dams were constructed on July27th and 28th, 1996.

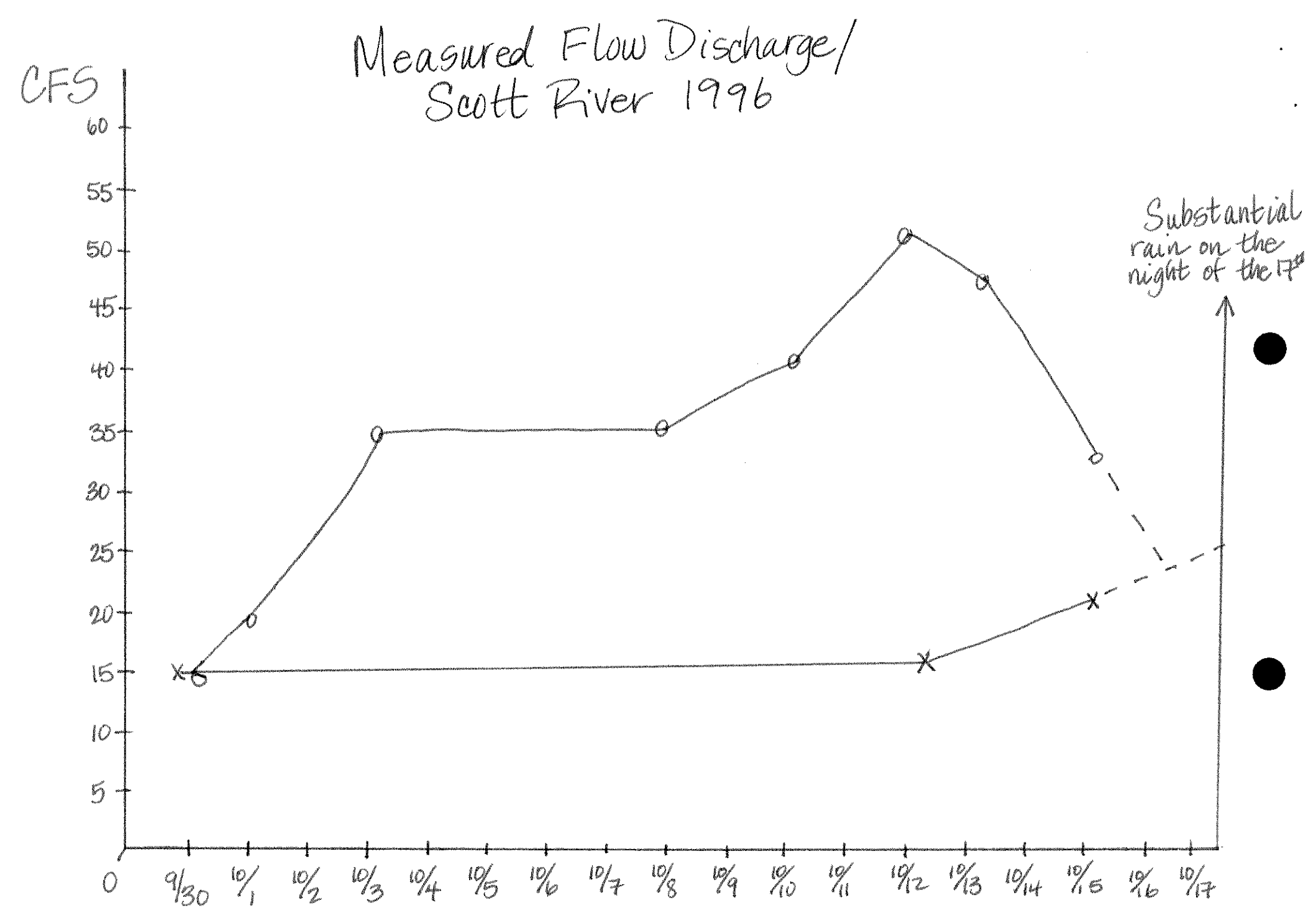
The dams sizes (elevations) were determined by the change in elevation of the surface water. The sizes ranged from 4' 6" to 6' 10". Because the gradient of the river is so flat water was backed up by single dam for over a mile. Each dam backed water up to the toe of the next one (original surface flow elevation). All four dames provided fish passage which allowed fish to move in both directions. The fish passage was a crude 'step-pool' fish ladder constructed of sand and covered by large sheets of plastic. Construction of the

dams was done with two D-7 cats, a back-hoe and a hand crew. The process was relatively quick. Siltation of the water was reduced by starting with the bottom dam and using the lower pool as a silt collection pond.

The dams also had a large culvert (36" diameter) placed at the bottom of the structure which were intended to transport the colder water on the bottom down stream. The RCD now sees that culvert flow regulation was poorly designed. Flow regulation allowed the entire water column (warm top water as well as cool bottom water) to be passed through the culvert. Hobo temps in the bottom of the pools remained relativity cool while the water passing through the culverts averaged 22 Celsius (roughly 72 Fahrenheit). **If the project were to be done over again the regulation of flow would be designed to pull only the water from the bottom of the dam rather then the whole column. I am confident the dams would have significantly cooled the surface flow leaving the demonstration location.** Further discussion and evaluation of temperature monitoring can be found in a report completed by Mike Farmer, a fish biologist (attached). The report was completed for the RCD due to concern over water temperature increases.

Monitoring and Determinations: The actual change in flow dynamics was remarkable. Water temperature was recorded with Hobo Temps. Surface water levels were recorded with staff gages, ground water elevations were recorded with monitoring wells installed by RCD, and water storage was determined by soil moisture holding capacity related to ground water elevation changes and measured flow discharge compared to a controlled flow upstream of the demonstration site. The data is best displayed in the attached graphs and compiled in the summary.

Measured Flow Discharge/ Scott River 1996



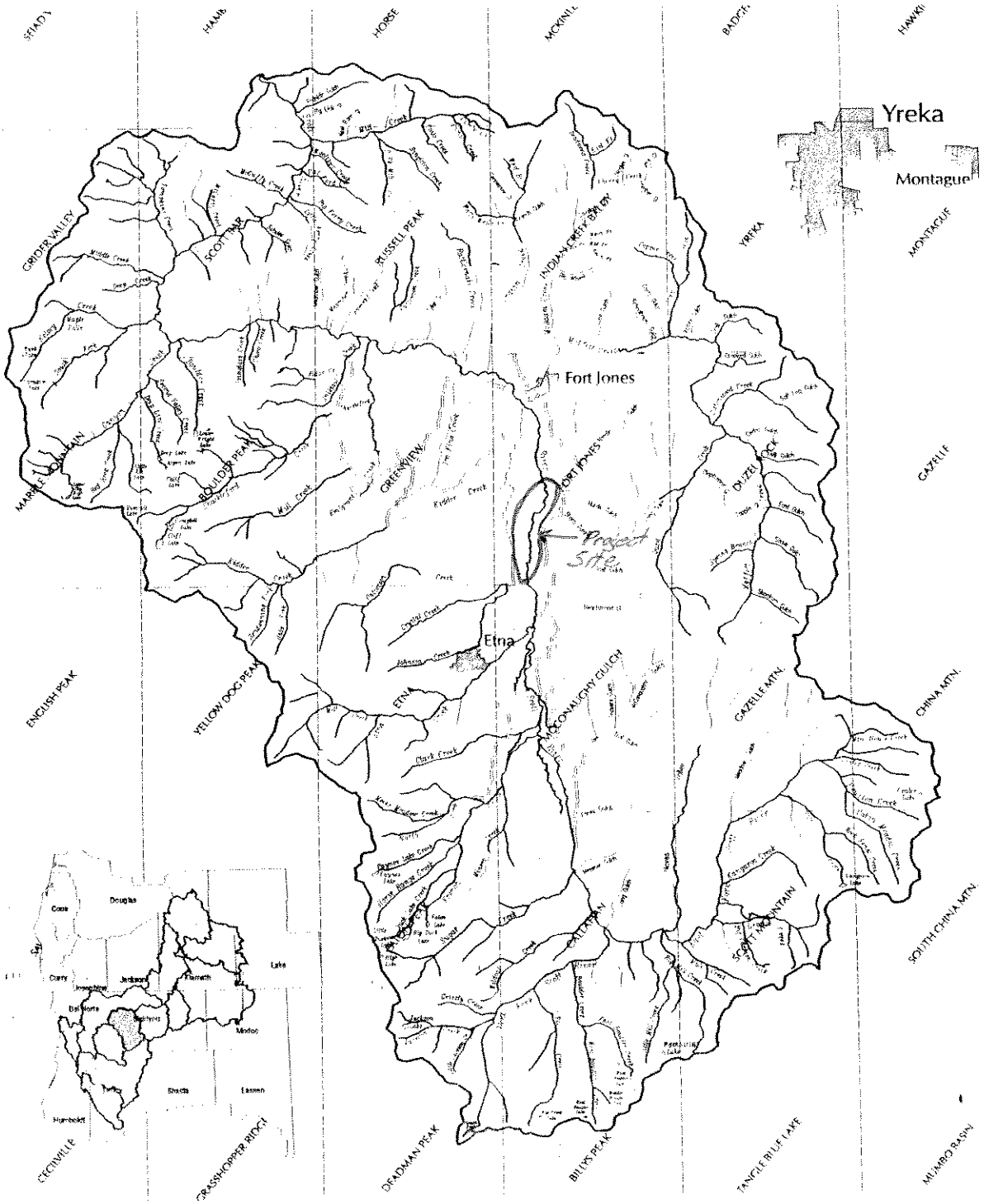
X = Control upstream of dams

O = Discharge from dams

*540 Acre feet released

*16 CFS Average increase for 17 days

SCOTT RIVER HYDROLOGIC SUBBASIN



Please indicate the location of the proposed project. Identify the project location by placing a colored point on the base map provided. For projects that are linear in nature, please highlight the stream reach of the proposed project.

USFWS Project Number: 14-48-001-95625

CDFG Project Number: _____

Project Proposer: Siskiyou RCD

Project Title: Beaver Dams - Flow Enhancement

Fiscal Year: 1997

5 2.5 0 5 10 15
kilometers

Stream Name: Scott River

Tributary To: Klamath

USGS Quad Name (1:24,000): Fort Jones

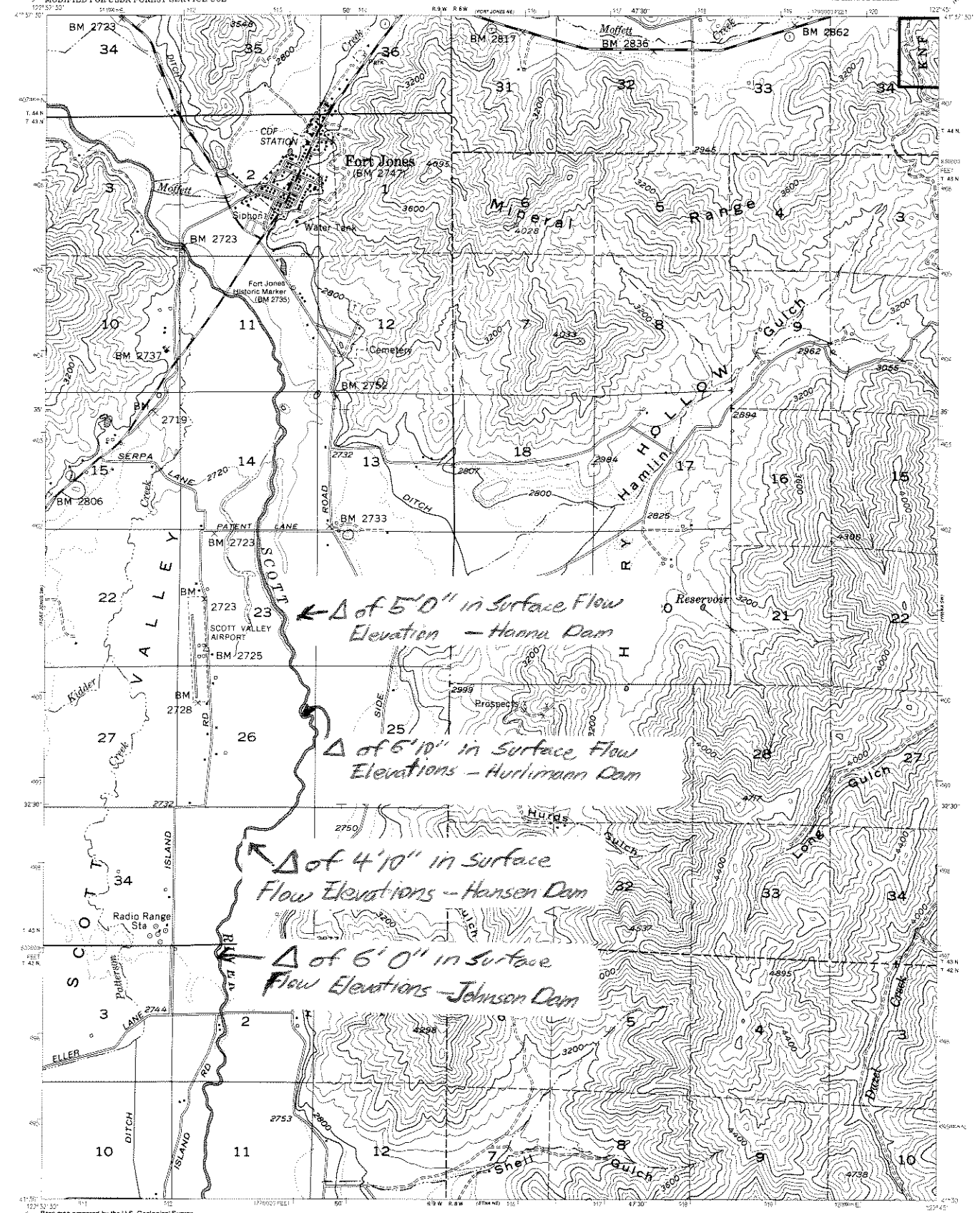
Township/Range: T42 R9W

Section Number: _____

Perennial Stream
Intermittent Stream
Ditch or Canal
1:24,000 USGS Quad

N
W E
S

Sand Dam Locations + Change in Surface Flow Elevations



Base map prepared by the U.S. Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1951. Field check 1954

Polyconic projection 1927 North American datum
10,000-foot grid based on California coordinate system, zone I
1000-meter Universal Transverse Mercator grid ticks, zone 10, shown in blue

INTERIM EDITION

Modification to USGS base map prepared by the Geomatronics Service Center from 1992 aerial photography and 1993 correction guides furnished by the Pacific Southwest Region.

Landnet revised according to additional Forest Service evidence.

UTM GRID AND 1984 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 80 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

LEGEND

- National Forest Boundary
- Alienated Land within the National Forest Boundary
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Locked Gate
- Road, Location Approximate
- U.S. Highway
- State Highway
- County Road
- Forest Highway
- Forest Road
- Forest Trail
- Trail Location Approximate

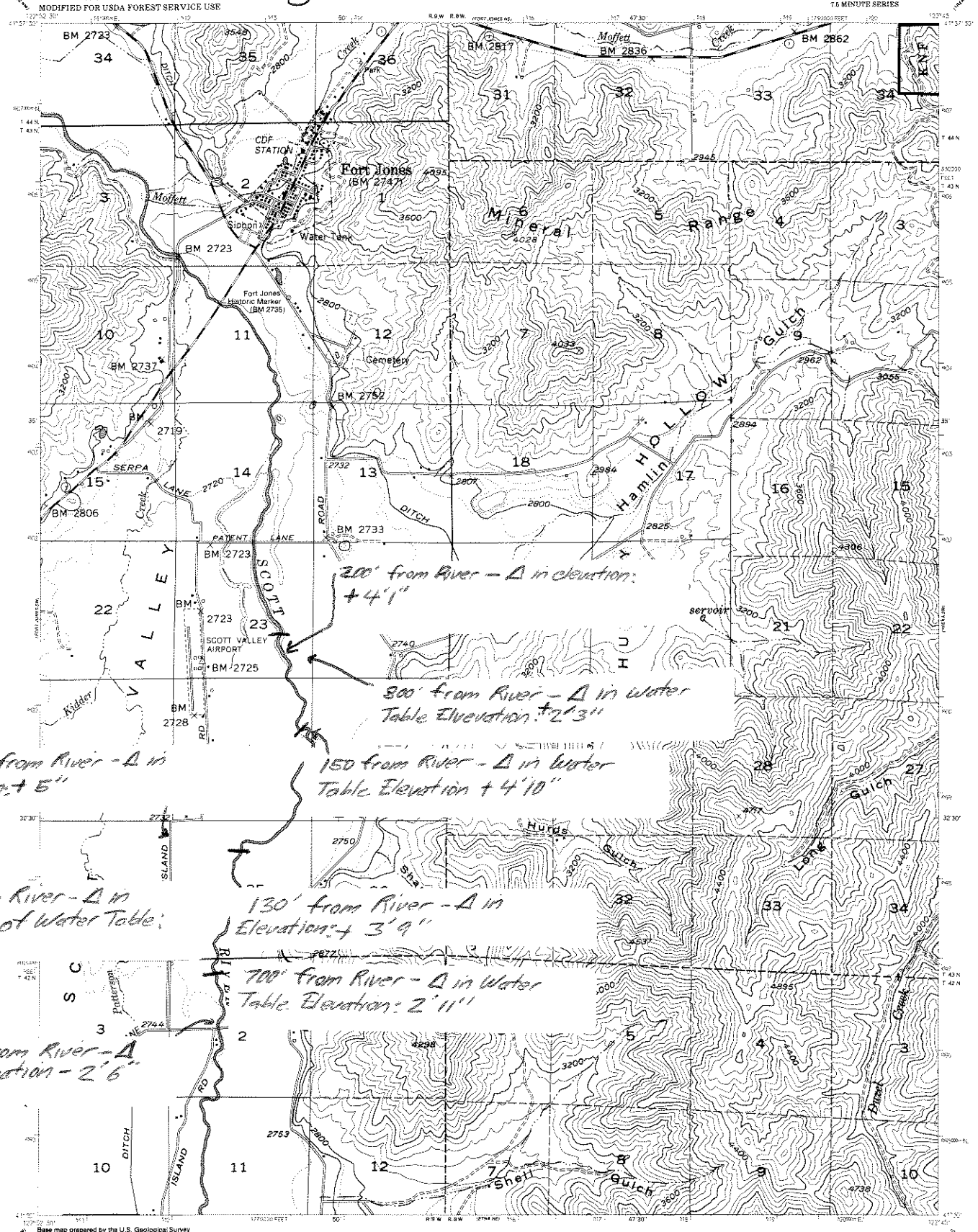
TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Approximate
- Unsurveyed, Protraction

KLAMATH NATIONAL FOREST
QUADRANGLE LOCATION DIAGRAM

FORT JONES SE, CALIF.
N4130-W12245/7.5
REVISED 1983

718-4C

Water Table Monitoring Locations & Change in Elevations of Water Table



Summary and Conclusions: In sum the Beaver Dams Demonstration projects has extreme merit. Fluctuating water tables is at the crux of many of the Scott Rivers problems. A stable water table would allow riparian zones to increase natural propagation. An established riparian zone would "constrict" the channels, improving the width-depth ratio. An improved width-depth ratio increases sediment transport. Increased sediment transport would allow for a more constant or stable channel. Finally, a stable water table would provide more surface water during the critical flow periods in the late summer and fall. Increased surface water and riparian cover improves fishery habitat and water quality (temperature). If the beaver dams demonstration projects were to be attempted again, the major change would be in the design of flow discharge out of the "ponds". Flow discharge designs would allow for only the cool water on the bottom of the dams to be transported downstream. This would provide for an overall cooling of the surface water.

The focus of the project was to determine if the amount of flow retained by the dams was significant. The demonstration project showed that the flow of the Scott River was doubled for 17 days. This is very significant. The release of the flows did cause adults to move upstream but the release was to soon. The 1603 stream alteration agreement could not allow the RCD to hold the water until the best time for release. The RCD feels this style of project should be looked at more closely. It can solve many of the problems related to fisheries in the Scott. It can also provide much needed water fowl habitat and increase the size and number of off channel-ponds and wetlands. We thank the Klamath Task Force for providing the funding on a such a project and feel the results will lead to a better understanding of the Scott River system.

Budget of Flow Enhancement -Beaver Dams Demonstration Project

ITEM	BUDGET	ACTUALLY EXPENDED
Salaries/Coordination	$3,952.57	$3,952.57
Supplies	$2,966.05	$2,773.12
Operation	$3,358.38	$3,333.38
Overhead	$1,542.00	$1,380.22
TOTAL	$11,819.00	$11,438.69
RETURNING		$380.31